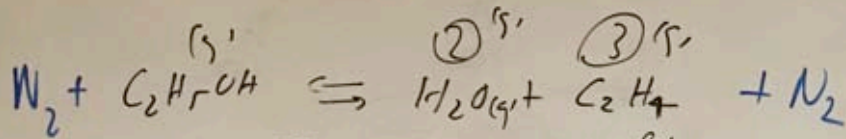


HW
17.7



$$T = 150^\circ\text{C} = 423^\circ\text{K}$$

1 bar

assume 1 mole

	n	y
1	$1 - \xi$	$(1 - \xi)/(2 + \xi)$
2	ξ	$\xi/(2 + \xi)$
3	ξ	$\xi/(2 + \xi)$
4	1	

With Nitrogen 4

$$\begin{aligned} &\rightarrow 2 + \xi \\ &(1 + \xi) \text{ with no N}_2 \end{aligned}$$

$$K_a = \frac{\xi^2 (P)}{(1 - \xi)(1 + \xi)}$$

$$= \frac{\xi^2}{2 - \xi^2}$$

	ΔH_{298}° kJ/mol	ΔG_{298}° kJ/mol
1	-235	-168
2	52.5	68.9
3	-29.2	-229

$$\Delta G_{298}^{\circ} = 168 + 68.9 - 229$$

$$= 8.9 \text{ kJ/mol}$$

$$\Delta H_{298}^{\circ} = 45.6$$

$$\ln K_4 = -\frac{\Delta G}{RT} \Rightarrow K_4 = 0.048$$

$$\ln K_{323} = \frac{-45600 \text{ J/mol}}{8.314}$$

$$\left(\frac{1}{423} - \frac{1}{298} \right)$$

$$- \left(\frac{8900 \text{ J/mol}}{8.314 (298)} \right)$$

$$= 1.83$$

$$K_{323} = 6.29$$

$$\frac{1}{8.29} = \frac{1}{f^2} - 1$$

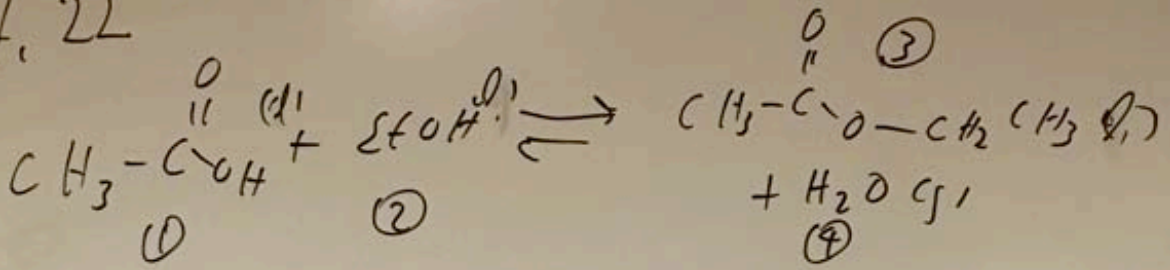
$$f^2 = \frac{1}{1 + \frac{2}{8.29} \frac{wK}{N_2}}$$

$$f = 0.86$$

$$(0.76)$$

HW

17.22



80°C

	n	X_i
1	$1-\xi$	$(1-\xi)/2$
2	$1-\xi$	$(1-\xi)/2$
3	ξ	$\xi/2$
4	ξ	$\xi/2$

2

80°C

353°K

$$K_a = \frac{\xi^2}{(1-\xi^2)}$$

$$\Delta G_{298}^\circ = -4.699 \frac{\text{kJ}}{\text{mol}}$$

$$\Delta H_{298}^\circ = -3.69 \frac{\text{kJ}}{\text{mole}}$$

$$\ln K_{298} = \frac{-\Delta G}{RT} = 1.89$$

$$\begin{aligned} \ln K_{353} &= \left(\frac{-\Delta H_{f,298}^\circ}{R} \right) \left(\frac{1}{T} - \frac{1}{T_{298}} \right) \\ &= \frac{+3,690 \text{ J/mole}}{8.314 \text{ J/mole K}} \left(\frac{1}{353} - \frac{1}{298} \right) + \ln K_{298} \\ &= +1.89 \end{aligned}$$

$e \downarrow$
lnka

$$k_{\text{eff}} = 5.29$$

$$\frac{1}{k_a} = \frac{1 - \xi^2}{\xi^2} = \frac{1}{\xi^2} - 1 = \frac{1}{5.29}$$

$$\left(1 + \frac{1}{5.29}\right)^{1/2} = \xi = 0.92$$

69.7%

Conversion of

b)

1	1 - ξ
2	3 - ξ
3	ξ
4	ξ
<hr/>	
4	

$$k_1 = \frac{\xi^2}{(1-\xi)(3-\xi)}$$

$$k_2 = \left(\frac{\xi^2}{3 - 4\xi + \xi^2}\right) = 5.29$$

$$\xi = 0.922 \quad \leftarrow$$

$$\frac{0.8}{3 - 0.3(0.8)} = \frac{0.18}{2.5} \quad \left(\frac{0.8}{2.5}\right)$$